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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,006	09/19/2003	Michael E. Mack	11460-127	9136
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BURNS & LEVINSON, LLP 125 SUMMER STREET BOSTON, MA 02110			EXAMINER MCDONALD, RODNEY GLENN	
			ART UNIT 1753	PAPER NUMBER
			MAIL DATE 08/09/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/667,006

Applicant(s)

MACK, MICHAEL E.

Examiner

Rodney G. McDonald

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 23-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-14 is/are allowed.
- 6) ☒ Claim(s) 15, 16, 18-20 and 23-26 is/are rejected.
- 7) ☒ Claim(s) 17 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 19, 23, 24, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (WO 02/052608 A2) in view of Sakai et al. (Japan 02-144841).

Regarding claims 15 and 19, Mack et al. teach a vacuum chamber 300. (Fig. 3) A gas cluster ion beam source disposed within the vacuum chamber for forming a gas cluster ion beam, the gas cluster ion beam having a beam axis. (See Fig. 3 for example; Page 7 lines 19-26) A workpiece holder 150 for holding a workpiece. (Page 6 lines 5-8) Mack et al. teach a low energy electron source within the vacuum chamber for neutralizing the space charge of the gas cluster ion beam. (Page 7 lines 30-35; Page 8 lines 1-5) A Faraday cup is provided for collecting gas cluster ion beam current for measurement to control the processing of the workpiece. (Page 8 lines 24-29; Abstract)

The difference between Mack et al. and the present claims is that the vented Faraday cup is not discussed (Claims 15, 19, 23, 25 and 26) and the enclosure comprising coaxial electrically conductive ring electrodes disposed with gaps between the ring electrodes. (Claim 24)

Regarding claims 15 and 19, Sakai et al. teach utilizing a Faraday cup that has meshes that allow leakage of gases from the Faraday cup. (See Sakai et al. Abstract)

Regarding claim 23, Sakai et al. teach that the vented Faraday cup is adapted to facilitate the escape of gas in directions lateral to the beam axis. (See Sakai et al. Abstract)

Regarding claim 24, Sakai et al. teach coaxial cylindrical electrodes having exhaust holes making up the Faraday cup. The cylindrical electrode are views as ring electrodes. (See abstract)

Regarding claim 25, Mack et al. discussed above and teach a Faraday cup having a strike plate for receiving a gas cluster ion beam. (See Mack et al. discussed above) Sakai et al. teach that the Faraday cup enclosure should be vented by making the enclosure of mesh to allow for escape of gas. (See Sakai et al. Abstract)

Regarding claim 26, Sakai et al. teach that the gas escapes in a direction lateral to the axis of the ion beam. (See Sakai et al. Abstract)

The motivation for utilizing the features of Sakai et al. is that it allow for preventing gas from filling the Faraday cup. (See Sakai et al. abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Mack et al. by utilizing the features of Sakai et al. because it allows for preventing gas from filling the Faraday cup.

Claims 16, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. in view of Sakai et al. as applied to claims 15 and 19 above, and further in view of Fuzishita et al. (U.S. Pat. 4,916,311).

The differences not yet discussed are that the particulars of the low energy electron source is not discussed (Claims 16, 20) and the ion beam current or the gas flow is not discussed (Claim 18).

Regarding claims 16, 20, Fuzishita et al. teach a low energy electron source for neutralizing the space charge of an ion beam. (See Abstract) Fuzishita et al. teach in Fig. 5 one or more filaments 17 for emitting electrons. A filament power supply 18 for biasing the one or more filaments to induce low energy electron emission. An anode electrode 120 for accelerating the electrons away from the one or more filaments 17 and toward a gas cluster ion beam 5 having an axis so as to have a neutralizing effect on the space charge of the gas cluster ion beam 5. An acceleration power supply 121 for biasing the anode electrode 120 with respect to the one or more filaments 17. A deceleration electrode 122 for decelerating the accelerated electrons. Means for biasing 123 for biasing the deceleration electrode with respect to the one or more filaments. (See Fig. 5; Abstract; Column 8 lines 9-27)

The motivation for utilizing the features of Fuzishita et al. is that it allows for neutralizing the ion beam. (See Abstract)

Regarding claim 18, Mack et al. teach controlling current and such is believed to adjustable to meet the required current of the claims. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilized the features of Fuzishita et al. because it allows for neutralizing the ion beam.

Allowable Subject Matter

Claims 1-14 are allowed.

Claims 17 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1-8 are allowable over the prior art of record because the prior art does not teach a low energy electron source for at least partially neutralizing space charge of a gas cluster ion beam comprising one or more filaments for emitting electrons; a filament power supply for biasing said one or more filaments to induce low energy electron emission; an anode electrode for accelerating said electrons away from the one or more filaments and toward a gas cluster ion beam having an axis so as to have a neutralizing effect on the space charge of said gas cluster ion beam; an acceleration power supply for biasing said anode electrode with respect to said one or more filaments; a deceleration electrode for decelerating said accelerated electrons; and wherein said one or more filaments each have a positively biased end and a negatively biased end and further wherein said deceleration electrode is directly connected to the positively biased end of said one or more filaments.

Claims 9-14 are allowable over the prior art of record because the prior art does not teach are allowable over the prior art of record because the prior art of record does not teach the claimed vented faraday cup including a plurality of substantially coaxial

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electrically conductive ring electrodes disposed with gaps between the ring electrodes wherein the plurality of electrically conductive ring electrodes are arranged and electrically connected in at least three groups of at least two ring electrodes, each group independently electrically biased so as to minimize undesired charged particle leakage into or out of the cup.

Claim 17 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the vented enclosure surrounding and extending in front of the strike plate and comprising a multiplicity of electrically conductive ring electrodes disposed with gaps between the ring electrodes wherein the multiplicity of electrically conductive ring electrodes are arranged and electrically connected in at least three groups that are independently electrically biased for minimizing undesired charged particle leakage into or out of the faraday cup and each of the at least three groups of electrically connected ring electrodes comprises two or more ring electrodes.

Claim 27 is indicated as being allowable over the prior art of record because the prior art does not teach the claimed subject matter including wherein the vented enclosure comprises a plurality of substantially coaxial, electrically conductive ring electrodes disposed with gaps between the ring electrodes, and further wherein said plurality of ring electrodes are arranged and electrically connected in at least three groups of at least two ring electrodes, each group adapted for independent electrical biasing to minimize undesired charged particle leakage into or out of the cup.

Response to Arguments

Applicant's arguments filed May 17, 2007 have been fully considered.

Claim 1 has been amended to overcome the rejection based on Fuzishita et al.

Claims 1-14 have been indicated as allowable.

Claims 17 and 27 have been objected to.

Claims 15, 16, 18-20, 23-26 have been rejected.

In response to the argument that Mack et al. does not teach a vented Faraday cup, it is argued that newly cited reference to Sakai et al. teach a vented Faraday cup with openings for allowing gas to escape. (See Sakai et al. discussed above)

This action will be made NON-FINAL based on the newly cited reference to Sakai et al. which teaches a vented Faraday cup.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-TH with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rodney G. McDonald
Primary Examiner
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RM
August 1, 2007